## Brooks, Laura

**From:** Rampe, John
**Sent:** Tuesday, August 02, 2005 4:05 PM
**To:** Spreng, Carl; David Kruchek; Kimmel.Larry@epamail.epa.gov; Aguilar.Mark@epamail.epa.gov
**Cc:** Brooks, Laura; Walstrom, Jan; Shelton, Dave; Castaneda, Norma
**Subject:** FW: N&E GW response to comments

NE GW Response to Comments 072...

Dear Friends:

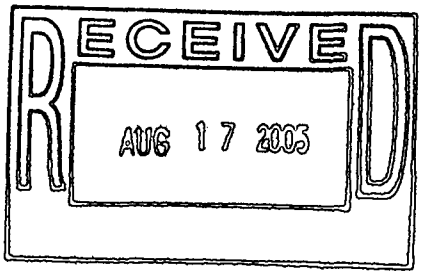
Attached are our proposed responses to agency comments on the Nature and Extent report for groundwater. Please let us know if you have any further comments. Assuming that these are sufficient, we'll go ahead and put this document in its draft final form and post it as an RFI/RI chapter on our website.

Thanks for your help.

JT

-----Original Message-----
From: Brooks, Laura
Sent: Monday, August 01, 2005 10:41 AM
To: Rampe, John
Subject: N&E GW response to comments

<<NE GW Response to Comments 072405.doc>> For your review. If this is ok, please forward to the agencies for their review. Thanks, LMB




ADMIN RECORD



SW-A-005112

## Comment Response
## 7/1/05 EPA Comments, 6/29/05 FWS Comments and 6/24/05 CDPHE Comments on June 9, 2005 Draft Nature and Extent of Groundwater Contamination Summary Report

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| General Comment 1 | EPA | The report discusses the evaluation of groundwater analytical data to support AOI Screening Step 5. The text suggests that data is evaluated to assess whether a contiguous mappable plume exists. However no groundwater plumes are presented to demonstrate the results of this evaluation. The groundwater plumes resulting from this screening step should be provided. | Groundwater contaminant plumes are not presented in the Draft Groundwater Nature and Extent section but will be presented in the Fate and Transport section of the RI/FS Report. Groundwater contaminant plumes are presented in the Final Groundwater Interim Measures/Interim Remedial Action (IM/IRA) document dated June 21, 2005 for the AOIs identified in the Draft Groundwater Nature and Extent. A reference will be included in the revised Groundwater Nature and Extent document indicating that plume maps can be found in the Fate and Transport section of the RI/FS. |
| General Comment 2 | EPA | The report presents figures depicting the nature and extent of the groundwater Analytes of Interest (AOIs). However, the scale of the maps presented does not allow for evaluation of the nature and extent of contamination. Many well locations are overposted on top of other well locations and the size of the symbols relative to the Site map obscures the ability to identify the locations where exceedances occur. The Figures should be produced at a scale that allows for interpretation of the results of the AOI determination and the nature and extent of contamination. | The current scale of the nature and extent maps will be retained. The maps included in the Groundwater Nature and Extent were constructed in a manner to avoid overposting of well locations where the potential AOI exceeded the standard. The AOI categories were layered so that the locations exceeding the standard are posted as the top layer and locations less than the standard are posted on the lower layers. If overposting occurs, the locations that exceed the standard are overposted on locations that do not exceed the standard. Thus, locations that exceed the standard are not obscured by locations that are less than the standard. This language will be added to section 5.0. |
| General Comment 3 | EPA | The report evaluates the analytical data from a large number of wells at RFETS and separates these wells into upper hydrostratigraphic unit (UHSU) wells and lower hydrostratigraphic unit (LHSU) wells. However, not all UHSU wells and LHSU wells are screened in the same geologic materials and some wells may have been installed at shallower depths relative to contiguous wells nearby. This would potentially bias the evaluation of wells as part of Analyte of Interest (AOI) Screening Step 5. The document should include a table with all pertinent well construction information including | A table will be provided in the revised Groundwater Nature and Extent section incorporated into the RI/FS Report showing the pertinent well construction information including the screened interval, top of casing elevation, depth to top and bottom of screen, formation screened, and bedrock elevation. |

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| | | screened interval, top of casing elevation, depth to top and bottom of screen, formation screened and bedrock elevation to support AOI Screening Step 5. | |
| 1 | EPA | **Acronyms List.** AOI in the list is defined incorrectly. Please revise. | The AOI definition in the list will be revised to read "analyte of interest." |
| 2 | EPA | **Section 3.1, Page 3**. This section discusses the data source for data used in the report. The last sentence suggests that specific data sets used for evaluation of groundwater nature and extent are presented on a disk in Appendix A and B. The data is not included in Appendix A and B on the disk provided with the report. The data should be provided. | Data used to prepare this report will be included on a CD with the revised Groundwater Nature and Extent section incorporated into the RI/FS Report. |
| 3A | EPA | **Section 4.4, Page 5**. This section discusses comparison with the Colorado Water Quality Regulations. The text refers to the Colorado groundwater and surface water statutes but does not reference them. These documents should be referenced to insure that the most recent version of these regulations has been used. | The Colorado groundwater and surface water statutes were used to prepare the Draft Groundwater Nature and Extent are listed below. References to these statutes and regulations will be included in the revised Groundwater Nature and Extent section incorporated into the RI/FS Report.<br><br>CDPHE Water Quality Control Commission Regulation No. 31, The Basic Standards and Methodologies For Surface Water (5 CCR 1002-31), Amended November 8, 2004, Effective March 22, 2005.<br><br>CDPHE Water Quality Control Commission Regulation No. 38, Classifications and Numeric Standards South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin (5CCR 1002-38), Amended September 13, 2004, Effective January 20, 2005.<br><br>CDPHE Water Quality Control Commission Regulation No. 41, The Basic Standards For Ground Water (5 CCR 1002-41), Amended November 8, 2004, Effective March 22, 2005.<br><br>CDPHE Water Quality Control Commission Regulation No. 42, Site-Specific Water Quality Classifications and Standards for Ground Water (5 CCR 1002-42), Amended August 13, 2001, Effective September 30, 2001. |
| 3B | EPA | In addition the text suggests that the surface water standard used in the evaluation is defined as the greater of the lowest surface water standard or the | The practical quantitation limits (PQLs) are the same PQLs used in the Groundwater IM/IRA. A list of the surface water |

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| | | Practical Quantitation Limit (PQL). However, the source of the PQLs is not given. The source of the PQLs used in the report should be included. | standards and PQLs used in the Groundwater IM/IRA, Nature and Extent of Groundwater Contamination Summary Report and the Nature and Extent of Surface Water and Sediment Contamination Summary Report will be provided to the agencies in August. |
| 4 | EPA | **Section 4.5, Page 5**. This section discusses AOI Screening Step 5: the determination of a contiguous mappable plume. The text suggests that three adjacent wells represent sufficient spatial extent to define a mappable, contiguous contaminant plume area. However, no information is provided on the constraints put on the adjacency of the wells evaluated, such as distance between wells, use of flowpaths, etc. It is possible that isolated contamination may not have been investigated such that adjacent wells were properly placed to assess the spatial extent of contamination. This may be especially true in the LHSU where there are a small number of wells with wide spatial distribution. Also, as commented previously, the plumes resulting from this screening step are not presented in the document. The document should present the results of this screening step using plume depictions or other methods to clarify the results. | The determination of a contiguous mappable plume was based on a number of factors including the relative location of adjacent wells, groundwater flow directions, and likely contaminant plume widths that resulted in a professional judgement as to the contiguous, mappable nature of potential groundwater contamination.<br><br>• The relative location of adjacent wells was based on an approximate radius of 300 feet from a well(s) with contaminant concentrations above the surface water standard. This distance was derived during the development of plume isopleth maps for the report "Evaluation of Natural Attenuation and Biodegradation Potential of Chlorinated Aliphatic Hydrocarbon Compounds in Groundwater at Rocky Flats (K-H 2004);"<br><br>• Groundwater flow directions were obtained from the report "Site-Wide Water Balance Model Report for the Rocky Flats Environmental Technology Site (K-H 2002);" and<br><br>• The approximate width and length of contaminant plumes at RFETS was estimated in the report "Evaluation of Natural Attenuation and Biodegradation Potential of Chlorinated Aliphatic Hydrocarbon Compounds in Groundwater at Rocky Flats (K-H 2004)." Furthermore, median plume widths of chlorinated solvent plumes have been estimated by Aziz et al. (2000) ranging between 300 and 750 feet. Because lateral dispersion is typically weak (Pankow and Cherry |

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| | | | 1996), the width of plumes is largely dependent on the width of the source area, which at RFETS appears to be limited to 300 feet or less.<br><br>The previous four paragraphs will be added to section 4.5.<br><br>In evaluating the nature and extent of contaminants in the LHSU, given the wide distribution of wells the conclusions of several studies were considered to determine the potential for contaminant plumes. Also, an evaluation of well completion details, the presence or absence of overlying contamination in the UHSU, and the potential for LHSU to impact surface water quality was considered. All of this information was used to determine whether potential AOIs should be retained or eliminated.<br><br>In 1996, an evaluation of vertical contaminant migration potential between the UHSU and the LHSU was performed for the site (RMRS, 1996) to determine if trace contaminants found in the LHSU were derived from vertical migration of constituents from the UHSU. This study concluded that the LHSU is essentially hydraulically isolated from the UHSU. Hydraulic isolation is due to LHSU groundwater existing in low-permeability claystones and vertical contaminant transport was likely limited to the upper few tens of feet of the LHSU where fractured claystones occur. Contaminant extents were limited, and many of the trace contaminants found in LHSU groundwater may have resulted from cross-contamination during well installation.<br><br>Background geochemical characterization of the UHSU and LHSU, based on major ion and stable isotope geochemistry, revealed that these units have different groundwater chemistry (EG&G, 1993, 1995a, and 1995b). This provides further evidence of their hydraulic isolation from one another and also strongly suggests that contaminants in the UHSU |

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| | | | and upper LHSU, do not pose a threat to water quality in the deeper Laramie-Fox Hills Aquifer (RMRS, 1996). Furthermore, vertical hydraulic gradients between the UHSU and the LHSU generally indicate that vertical groundwater flow is downward from the UHSU to the LHSU which further suggests that groundwater in the LHSU does not discharge to surface water, and thus, poses no threat to surface water quality (RMRS 1996; EG&G 1995a).<br><br>The previous three paragraphs will be added to section 4.8.<br><br>As provided in the Response to General Comment 1, Groundwater contaminant plumes are not presented in the Draft Groundwater Nature and Extent section but will be presented in the Fate and Transport section. Groundwater contaminant plumes are presented in the Final Groundwater Interim Measures/Interim Remedial Action (IM/IRA) document dated June 21, 2005 for the AOIs identified in the Draft Groundwater Nature and Extent. A reference will be included in the revised Groundwater Nature and Extent document indicating that plume maps can be found in the Fate and Transport section of the RI/FS. |
| 5 | EPA | **Section 4.6, Page 6**. This section discusses the use of process knowledge to eliminate AOIs even though mappable plumes may be present. The text discusses various reasons that may be employed to remove an analyte from consideration. Reasons for the elimination of anaytes based on process knowledge occur as footnotes in Table 2. However the footnote discussing the elimination of Radium 226 and Radium 228 is questionable. The text does not discuss whether radium isotopes were involved with historic RFETS processes. Also, the text suggests that the radium may be natural, but it appears that many values are above the 99/99 background UTL which means that the values are above the site specific background levels. The text should provide additional discussion and justification for removing the Radium 226 and Radium 228 values. | Review of the groundwater radium data and Draft Groundwater Nature and Extent screening process indicates that dissolved Ra-226 + Ra-228 and dissolved or total Ra-226 or Ra-228 were not retained as an analytes of interest (AOIs) because there is not a surface water standard for these analytes. The surface water standard for radium is total radium-226 (Ra-226) + radium-228 (Ra-228) and is 5 pCi/L. At RFETS, Ra-228 is the predominant radium isotope comprising the total radium activity.<br><br>In screening total Ra-226 + Ra-228 data, the 99/99 upper tolerance limit (99/99 UTL) for dissolved Ra-226 + Ra-228 (6.3 pCi/L) was used for the UTL screen because there are no background data for total Ra-228 in groundwater to allow |

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| | | | development of a total radium 99/99 UTL. In using the 99/99 UTL for dissolved radium to compare total Ra-226 + Ra-228, we recognize that this screen is conservative, since radium is a moderately sorbed constituent on the particulate fraction. The dissolved radium 99/99 UTL likely underestimates the total Ra-226 + Ra-228 background activity in groundwater since total radium represents both the dissolved and sorbed fraction transported by groundwater and its UTL should be higher than the dissolved radium UTL.<br><br>Review of the available total Ra-226 + Ra-228 data (26 locations) shown on Figure 1 indicates that the groundwater results range between 3.9 and 157.4 pCi/L with a median value of 9.2 pCi/L. All but four of the total radium results are above the dissolved radium UTL (as expected) and the surface water standard. However, it is believed that most of these results are representative of background total radium and only five results appear to represent potential contamination. Most of the results (21 locations) are less than 20 pCi/L, four results are between 20 and 30 pCi/L, and one result is 157 pCi/L.<br><br>The highest total radium result occurs at well 56993 in the Ash Pit area (IHSS 133.2). The other locations with total radium results above 20 pCi/L occur at the Original Landfill (well 58693), the West Spray Field (well 50894), and adjacent to Buildings 331 (well P115489) and 551 (P115589). All of these locations have adjacent wells whose total radium activity appears to be representative of background, thus limiting the potential for a contiguous, mappable total radium groundwater plume of significant areal extent to exist and potentially impact surface water.<br><br>A review of the historical radium use at RFETS is presented in the July 15, 2005 "Review of Historical Knowledge |

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| | | | Related to Metals and Selected Radionuclides Identified as Environmental Media Analytes of Interest White Paper" (DOE 2005). Information presented in this white paper from the ChemRisk Task 1 Report (CDH 1991) concerning radium indicates that Ra-226, a daughter of uranium-238 decay, was used in small quantities for research, analysis, and calibration (e.g., sealed and plated sources) at the Site. In addition, the only Ra-226 waste generated at RFETS, based on WEMS and WSRIC, was as sealed sources. Because of the limited quantity of Ra-226 used and its waste form, it was not carried forward through the ChemRisk process (CDH 1991). However, Ra-226 is a daughter product of U-238 decay and could be potentially derived from both natural uranium present in the region and uranium metal fabrication and processing conducted at the site.<br><br>Ra-228 was not identified in the ChemRisk Task 1 Report as a radionuclide used at the Rocky Flats Plant (CDH 1991). Furthermore, no Ra-228 waste was reported to have been generated based on WEMS and WSRIC. However, thorium-232, the parent radionuclide for Ra-228, was used at RFETS to fabricate metal parts from thorium and thorium alloys in Building 881. Thorium and its compounds were also used in analytical procedures and other research and development programs in Building 771. It was concluded during the development of the ChemRisk reports that Th-232 was most likely released as airborne particulates and was not a significant component of airborne effluent (CDH 1991). Furthermore, Th-232 was not used in significant quantities relative to other production radionuclides, thus, a source term was not developed for Th-232 during the ChemRisk evaluation.<br><br>Because of the limited use of radium and thorium at the site and the limited areal extent of potential total radium contamination at the site, total Ra-226 + Ra-228 will not be |

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| | | | retained as an AOI. |
| 6 | EPA | **Section 5.0, Page 10**. This section discusses the nature and extent of contamination. The first bullet in this section suggests that VOCs with blank qualifiers be treated as non-detects. It is suggested that the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* be used for treating blank qualified organic data (EPA, 1999). | CDPHE requested that VOCs with blank qualifiers be considered non-detects to avoid spurious analyte outliers in the data since some of the blank qualified results exceeded the surface water standard where the surface water standard was higher than the contract required reporting limit. However, in the final draft RI/FS report, validated B qualified data from the lab will be considered a detected result consistent with the following EPA guidance:<br><br>EPA, 2005, USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Draft Final, OSWER 9240.1-46, EPA-540-R-04-009, January.<br><br>EPA, 2001, USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review, Final, OSWER 9240.1-34, EPA-540-R-00-006, June.<br><br>EPA, 1999, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, EPA-540-R-99-008, October. |
| 7 | EPA | **Table 2**. Table 2 presents the data used for the determination of the AOIs for RFETS groundwater. The table presents the various analytes in an apparent random order. The table would be easier to use if metals, VOCs etc. were grouped together and were in alphabetical order. | The results presented in Table 2 are not presented in random order. The information is listed in order of increasing frequency of detection above the lowest surface water standard or PQL (whichever is higher). By listing in order of frequency of detection above the standard, one can easily scan the table to determine which analytes are AOIs. A note explaining this will be added to Table 2. |
| 8A | EPA | **Figures.**<br>Figures 1 and 2 present well location maps for the UHSU and LHSU. However, these figures do not show the well location numbers. The maps should provide the well location numbers. | Figures 1 and 2 will be produced as Plates 1 and 2 (D- or E-sized drawings) that include the well numbers at the well locations in the revised Groundwater Nature and Extent. |
| 8B | EPA | **Figures.**<br>Figures 5 through 22 show the locations of monitoring wells along with | The current scale of the nature and extent maps will be retained. The maps included in the Groundwater Nature and |

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| | | colors corresponding to the six evaluation criteria discussed in Section 5.0. Many more figures at the same scale are included as Appendices A & B in the CD provided in the report. The scale of these maps is too large for meaningful interpretation of the values presented on the figures. Figures should be produced at a scale that will reduce the amount of overposting that is occurring and would allow for well numbers to be applied to the well locations. | Extent were constructed in a manner to avoid overposting of well locations where the potential AOI exceeded the standard. The AOI categories were layered so that the locations exceeding the standard are posted as the top layer and locations less than the standard are posted on the lower layers. If overposting occurs, the locations that exceed the standard are overposted on locations that do not exceed the standard. Thus, locations that exceed the standard are not obscured by locations that are less than the standard. |
| General Comment | FWS | Section 4.5 on page 5. There should be some discussion on the spatial determination of the wells during the determination of a contiguous mappable plume. If only one well has a hit, but there are no nearby wells, it could still be a plume, just not definable. This could be put into the professional judgment section and just referred to it in this section. | Please see the response to EPA specific comment 4. |
| General Comment | CDPHE | Elizabeth has reviewed this section and confirms that it is basically identical to the N&E section of the draft GW IM/IRA. Therefore, the State has no comments on it. | No response needed. |

**References**

Aziz, C. E., A. P. Smith, and C. J. Newell, 2000, BIOCHLOR Chlorinated Solvent Plume Database, Air Force Center for Environmental Excellence, Brooks AFB, San Antonio, TX, June, 73 pp.

CDH (Colorado Department of Health), 1991, Project Task 1 Report (Revision 1) Identification of Chemicals and Radionuclides Used at Rocky Flats, ChemRisk, March.

DOE (U. S. Department of Energy), 2005, Draft Review of Historical Knowledge Related to Metals and Selected Radionuclides Identified as Environmental Media Analytes of Interest White Paper, June 15.

EG&G, 1993, Background Geochemical Characterization Report, EG&G Rocky Flats, Inc., Rocky Flats Plant, Golden, Colorado, September.

EG&G, 1995a, Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site, Volume II of the Sitewide Geoscience Characterization Study, Golden, Colorado, Final Report, April.

EG&G, 1995b, Groundwater Geochemistry Report for the Rocky Flats Environmental Technology Site, Volume III of the Sitewide Geoscience Characterization Study, Golden, Colorado, Final Report, January.

EPA (U. S. Environmental Protection Agency), 1999, USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, EPA-540-R-99-008, October.

EPA, 2001, USEPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review, Final, OSWER 9240.1-34, EPA-540-R-00-006, June.

EPA, 2005, USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Draft Final, OSWER 9240.1-46, EPA-540-R-04-009, January.

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Kaiser-Hill Company, LLC and URS Group, Inc., 2004, Evaluation of Natural Attenuation and Biodegradation Potential of Chlorinated Aliphatic Hydrocarbon Compounds in Groundwater at Rocky Flats, March.

Pankow, J. F. and J. A. Cherry, 1996, Dense Chlorinated Solvents and Other DNAPLs in Groundwater - History, Behavior, and Remediation: Waterloo Press, Portland, Oregon, 522 pp.

RMRS (Rocky Mountain Remediation Services), 1996, Final White Paper Analysis of Vertical Contaminant Migration Potential, Prepared for U. S. Department of Energy, RF/ER-96-0040.UN, August 16.